

REMARKS/ARGUMENTS

Claims 12 and 14-16 have been cancelled in favor of new Claims 17-20. The new claims depend from the product claim and are drawn to narrower and more preferred embodiments of the invention.

New Claim 17 finds support at the second paragraph on page 7.

New Claims 18 and 19 find support at the first paragraph on page 6.

New Claim 20 finds support at the first paragraph on page 7.

No new matter is believed to be added by entry of the amendments. In addition, no new search or consideration is required. The amendments do not add more claims than are cancelled in this amendment. Accordingly, Applicants kindly request that the amendments be entered and given favorable consideration.

Applicants thank Examiner Ahmed for acknowledging their claim to foreign priority and for indicating that the priority documents have been received. Thus, with the amendments and remarks submitted herein, this application should now be ready for allowance and issue.

The art rejection is traversed. The present invention is not obvious over Oishi (U.S. ‘717).

The U.S. ‘717 reference is deficient for the following reasons: (1) there is no suggestion of lamina particles; (2) there is no suggestion of lamina particles obtained by exfoliating crystals of a layered titanium oxide; (3) there is no disclosure of organic film thickness or polymer layer film thickness as claimed; (4) the inorganic layer thickness relied on by the Office in the reference (1,000Å and 800Å at column 6, line 58) is for ITO and SiO₂ films respectively, which has nothing to do with the lamina particles obtained by exfoliating

microcrystals of a layered titanium oxide; (5) there is no disclosed relationship between the TiO₂ particle size (500Å - col. 5, line 41) and layer thickness; and (6) the reference discloses that “Fig. 1 is a view showing a typical cross-sectional structure” of the film (column 6, line 53 *ff*) - and, in contrast to the claims, the scale of this “typical” cross-section shows that the disclosed organic film (1) is many times thicker than either the inorganic film (4) or the particle layer (3) shown in Fig. 1 and relied upon by the Office. Accordingly, there is no teaching in the reference that makes the claimed invention obvious.

The Office has not adequately established how the “multilayer structure” composed of, e.g., a “PET” film, a silane coupling layer, a particulate layer, and a silica layer (reference embodiment 1, column 6) obviates the claimed invention, which consists essentially of polymer layers and layers of lamina particles alternately assembled, the lamina particles being obtained by exfoliating microcrystals of a layered titanium oxide, wherein a film thickness of the layers is controlled within a range of from sub-nm to nm.

The reference does not suggest layer thickness of sub-nm to nm. Indeed, the TEM photograph at Fig. 2 shows a “50 nm” scale at the bottom of the “actual cross-section” of the embodiment 1 film, and with this scale it is clear that the referenced film does not have the sub-nm to nm thickness of the film as claimed. Moreover, the TEM photograph makes it clear that the reference film does not have the alternating structure of polymer layers and layers of lamina particles as claimed.

It is also clear from the reference that the PET film refers *not* to the film constituent layers, but rather to the *substrate*. Even if the claimed polymer layer were construed to read upon the PET substrate described in the reference, there is no support or teaching in the reference for an alternating substrate.

It is clear that the structure described in U.S. '717 is completely different from that as claimed. Moreover, there is no suggestion of the remarkable effects obtained by the present invention. For example, Fig. 2 in the present application shows UV absorption spectrum data of an example of the present invention. It is clear that each of the components in the example is adsorbed in substantially the same amount on the substrate surface in each adsorption step reproducibly and repeatedly and, as a result, a multilayer film having layers of titania nanosheets and layers of PDDA alternately assembled can be obtained. As discussed in the specification (page 8, for example), the peak having a maximum absorbance at 265 nm is attributable to the nanosheets, and the PDDA has no significant absorption within this range. Applicants also point out the X-ray and ellipsometry data shown in Figures 3 and 4 in the present application, which also attest to the regularity of layers possible with the present invention. Thus, the ultrathin film of the present invention allows for excellent layer regularity as is evident by distinct diffraction peaks based on the repeated period of nanosheets and alternating polymer layers. There is no suggestion of either the claimed invention or the remarkable performance aspects achieved by the present invention in the cited reference to U.S. '717.

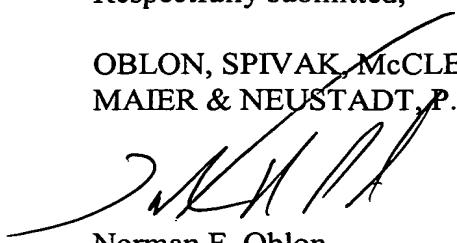
For all the reasons given above, the invention is not obvious over U.S. '717, and withdrawal of this ground of rejection is kindly requested.

Applicants kindly request the Examiner to rejoin the non-elected method claims with the product claims, noting that the method claims incorporate all the limitations of the allowed product by their dependence therefrom. The Office encourages this policy under M.P.E.P. § 821.04.

This application is now ready for allowance and issue, and an early notice of same is
kindly requested.

Respectfully submitted,

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